INSTRUCTION MANUAL

TYPE 1565-A

SOUND-LEVEL METER

GENERAL RADIO COMPANY

C

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TYPE 1565-A

SOUND-LEVEL METER

Form 1565-0100-C
March, 1967

GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

SPECIFICATIONS

Sound-Level Range: 44 to 140 dB (re 0.0002 μbar).

Weighting: A, B, and C weighting in accordance with American Standard ASA S1.4-1961 and IEC Publication 123, 1961.

Microphone: Lead-zirconate-titanate ceramic unit.

Output: At least 1.5 V behind 20 kΩ when meter reads full scale. Output is intended primarily for driving a TYPE 1556-B Impact-Noise Analyzer, a graphic level recorder, or headphones. Harmonic distortion, 2% or less for frequencies above 200 c/s and 5% or less for frequencies below 200 c/s (panel meter at full scale).

Meter: Rms response, and fast and slow meter speeds, in accordance with ASA S1.4-1961 and IEC Publication 123, 1961.

Auxiliary Input Provision: A TYPE 1560-P96 Adaptor is available to allow connection to any source fitted with a male 3-terminal microphone connector. Input impedance is approximately 13 MΩ in parallel with 25 pF. For correct weighting, source impedance must be 380 pF ± 5%.

Power Supply: One 1½-V size C flashlight cell. Battery life approximately 35 hours for 2 h/day service.

Environmental Effects:

Operating Temperature Range: 0 to 50°C.

Storage Temperature Range: —20 to +70°C (battery removed).

Operating Humidity Range: 0 to 90% RH.

Temperature Coefficient of Sensitivity: + 0.03 dB/°C.

Sensitivity to Magnetic Fields: Equivalent C-weighted sound level of a 1-oersted (80 A/m) 60-cycle field is about 47 dB when meter is oriented for maximum meter indication.

Calibration: Sound-level meter can be pressure calibrated at 400 c/s with a Type 1552-B Sound-Level Calibrator or at any frequency in the range from 20 to 2000 c/s with a Type 1559-B Microphone Reciprocity Calibrator.

Accessories Available: Type 1565-P1 Leather Carrying Case. Type 1560-P96 Adaptor to adapt input to mate with 3-terminal male microphone connector necessary for connection to vibration pickup. Type 1560-P95 Adaptor Cable to connect output to Type 1521-B Graphic Level Recorder or other devices fitted with jack-top binding posts on ¾-in centers.

Dimensions: Width 31/16, height 7⅜, depth 2⅛ inches (78 by 190 by 54 mm), over-all.

Net Weight: 1¾ pounds (0.8 kg).

Shipping Weight: 5 pounds (2.3 kg).

General Radio EXPERIMENTER Reference:
Vol 38, No. 10 & 11, Oct-Nov 1964

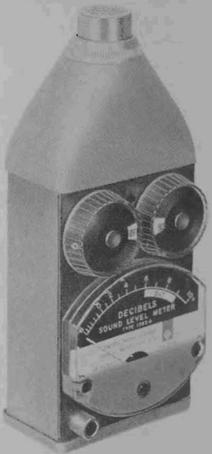

Figure 1.
Type 1565-A Sound-Level Meter.

NOTE

This book contains the operating instructions for the Type 1565-A Sound-Level Meter. More detailed information on noise-measuring techniques in general can be found in the General Radio "Handbook of Noise Measurement" ($1.00).

SECTION 1

INTRODUCTION

1.1 PURPOSE.

The Type 1565-A Sound-Level Meter (Figure 1) is designed for the measurement of A-, B-, or C-weighted sound levels at its microphone. It is simple and convenient to operate, and it is inexpensive. It covers the range from 44 to 140 dB, referred to .0002 μbar (the standard reference level). It meets the requirements of both the American Standard Specification S1.4-1961 for General-Purpose Sound-Level Meters and the IEC Recommendation 123, 1961.

1.2 DESCRIPTION.

The sound-level meter includes the following major sections: an omnidirectional microphone, a calibrated step attenuator, an amplifier, a panel meter, and weighting networks (simple filters) to modify the frequency response of the amplifier (see Figure 11).

The instrument is housed in a case of aluminum and high-impact plastic. The case is tapered at the microphone end, to minimize the effect of case diffraction.

The small size and light weight of the sound-level meter make it possible for the operator to hold it and operate it with the same hand.

1.3 CONTROLS.

The following controls and connectors are on the sound-level meter (numbers refer to Figure 2):

1. Eight-position rotary switch turns instrument on or OFF; selects weighting and meter speed; connects meter for battery check.
2. Nine-position rotary switch attenuator control; selects meter range.

3. Continuous rotary screwdriver control (located between dials) adjusts gain of instrument for calibration.

4. Phone jack supplies output voltage proportional to meter reading. (Output for full-scale meter indication is approximately 1.5 volts; output impedance is 20 kilohms.)

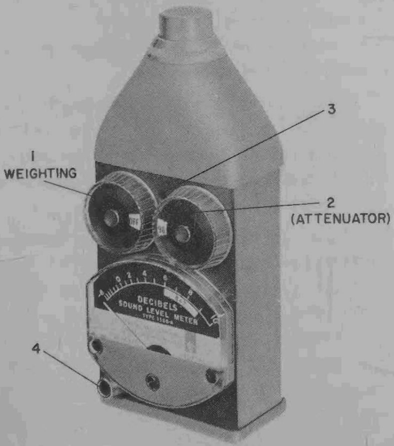

Figure 2. Controls and connectors on the Type 1565-A Sound-Level Meter.

1.4 ACCESSORIES.

A carrying cord is supplied with the sound-level meter. A stud fastened to the strap mates with a threaded insert in the bottom end of the case.

The available accessories include:

Type 1565-P1 Leather Carrying Case;

Type 1560-P96 Adaptor to adapt the input socket to mate with a standard, 3-terminal, male, microphone connector for connection to a vibration pickup, cable, or other transducer.

Type 1560-P95 Adaptor Cable to connect the output to the Type 1521-B Graphic Level Recorder or other device fitted with jack-top binding posts on 3/4-inch centers;

Type 1560-P52 Vibration Pickup (refer to paragraph 2.7).

SECTION 2

OPERATING PROCEDURE

2.1 CHECKING THE BATTERY.

Always check the battery before the instrument is used. Turn the left-hand knob to the BAT position. The meter must indicate in the region marked BAT. If it does not, the battery must be replaced. To do this, unscrew the large knurled nut above the knobs and remove the plastic nose cone. Remove the battery; then replace it with a Ray-O-Vac "C" cell, Type 1LP, or equivalent. Be sure the spring contacts are clean and are pressing on both terminals. Observe the proper polarity: the raised center terminal of the battery should contact the spring marked +.

The battery life is about 35 hours if used two hours per day, or about 20 hours with continuous use.

If the instrument is to be stored for an extended period or in an ambient temperature above 100 °F, remove the battery, to avoid the corrosive effects of battery leakage.

2.2 BASIC OPERATION.

Stand with the instrument in front of you, with the sound coming from the side. Point the microphone in a direction perpendicular to that from which the sound is coming.

Set the left-hand knob to C_F (C_{Fast}) and turn the right-hand knob until an on-scale meter indication is obtained. The C-weighted sound level is the algebraic sum of the level indicated by the meter and the setting of the right-hand knob (attenuator). For example, if the meter indicates +4 and the attenuator setting is 70, the C-weighted level is 74 dB. If the fluctuations of the meter cover 3 dB or less, use the average level indicated. When the fluctuations are greater than this, set the left-hand knob to C_S (C_{Slow}). The fluctuations of the meter will be markedly reduced, and an average level can then be readily estimated.

The sound level should be measured with each of the three weighting characteristics. After determining the C-weighted level, follow the same procedure with the left-hand knob at B; then repeat the procedure with the knob at A.

The weighting should always be included when a statement of sound level is given; without the weighting characteristic being known, the statement is meaningless.

2.3 CHOOSING THE WEIGHTING CHARACTERISTIC.

Noise codes and acceptance-test procedures frequently specify the weighting characteristic to be used. For example, A weighting is often used for the measurement of traffic, office, or plant noise.[1] When no standard test

[1] R. W. Young, Journal of the Acoustical Society of America, Vol. 36, pp. 289-295 (1964). D. P. Loye, Noise Control, Vol. 5, pp. 230-235, July, 1959.

procedure is involved, measurements should be made with each of the three weighting characteristics.

The frequency response of the sound-level meter for each weighting characteristic is shown in Figure 3. The C-weighting curve is nearly uniform over the frequency range from 32 c/s to 8 kc/s, thus giving an indication of the over-all sound pressure. The A-weighting characteristic discriminates heavily against low-frequency sounds to give an indication closely correlated with subjective estimates of loudness, annoyance, and speech interference. The B-weighting characteristic, between the A and C curves, is sometimes used in place of A weighting when the subjective effects of noise are of interest.

When a frequency analyzer is to be used with the sound-level meter, set the weighting switch to C.

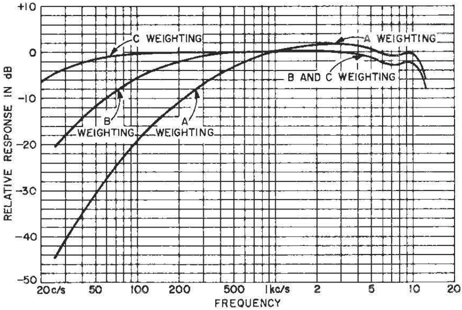

Figure 3. Typical A-, B-, and C-weighted random-incidence responses of the sound-level meter.

2.4 CALIBRATION.

A simple, reliable, over-all, level calibration can be obtained by means of a Type 1552-B Sound-Level Calibrator, driven by a suitable oscillator set to 400 c/s. The Type 1307-A Transistor Oscillator is small in size and is battery operated, making it ideal for field use.

The calibration procedure is as follows:

Unscrew the large knurled nut that surrounds the microphone and remove the nose cone. Set the left-hand knob to C_F and place the calibrator over the microphone. Adjust the screwdriver control between the knobs on the panel of the sound-level meter for an indication of 120 dB (110 on the attenuator and +10 on the meter). NOTE: This calibration will be made free of charge at any General Radio office.

2.5 EFFECT OF THE OPERATOR'S PRESENCE.

When the sound is coming mainly from one direction, the sound-level reading may be somewhat affected by the relative positions of instrument and observer. The Type 1565-A should not be held in front of the observer with the microphone pointed toward the source of the sound, although this is perhaps the most logical manner. This position gives a marked increase in the response at high frequencies. The observer, facing the sound from directly behind the instrument, acts as a reflector to produce errors of several decibels in the frequency range above 100 c/s.

A more uniform frequency response is obtained with the sound-level meter in front of the observer, but with the sound grazing the microphone (coming from the side, rather than from the front). When out of doors, hold the instrument with the microphone pointing upward, (to avoid interference from reflected high frequencies) and as far from the body as is convenient. Do not point the microphone toward a source of background noise (any source other than the one being measured).

The sound-level meter can be mounted on a tripod to reduce further the effects of the observer's presence. His position should be similar to that for handheld operation; a line between the observer and the instrument should be approximately perpendicular to a line from the instrument to the sound source.

2.6 USE OF AN EXTENSION CABLE.

The sound-level meter can be operated at some distance from its microphone if an extension cable, such as the Type 1560-P73, is used. However, several factors must be considered:

The use of the cable will change the source impedance as seen by the input terminals of the sound-level meter, thereby changing the weighting characteristics. To compensate for this, a capacitor must be added in series with the input to the sound-level meter. Also, cable losses will cause the meter to read low by an amount that varies with the cable length. Figure 4 shows the loss and the value of the compensat-

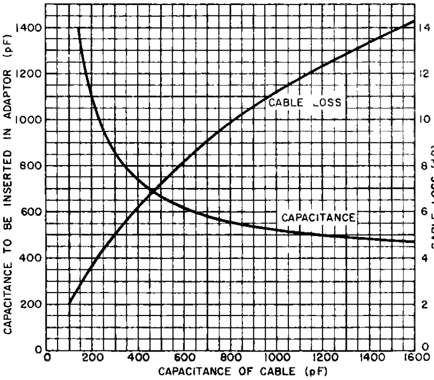

Figure 4. The compensation required for the capacitance of various extension cables. Chart also shows the corresponding cable loss.

ing capacitor for cable capacitances between 150 and 1500 pF.

The Type 1560-P73 Extension Cable, for use with the Type 1565-A Sound-Level Meter, is a 25-foot cable, fitted with standard 3-terminal microphone connectors. A Type 1560-P96 Adaptor and a Type 1560-3040 Microphone Base are needed to mate the sound-level meter and the microphone with the connectors. The capacitance of the Type 1560-P73 Extension Cable is approximately 550 pF. Figure 4 shows that a series capacitor of 640 pF is required for this cable capacitance. This capacitor can be installed in the Type 1560-P96 Adaptor, as follows:

Remove the outer shell of the adaptor. To do this, turn the setscrew located in the hole in the side of the shell in a clockwise direction. Remove the lead connecting terminal No. 3 of the microphone connector to one of the teflon insulated pin plugs, and replace the lead with a small mica or ceramic capacitor of about 640 pF. Then replace the outer shell.

The value of capacitance to be used with other cables can be determined from Figure 4.

To connect an extension cable, proceed as follows (see Figure 5):

Unscrew the knurled nut around the microphone cartridge on the sound-level meter and remove the plastic nose cone. Turn the two setscrews on opposite sides of the microphone cartridge in a clockwise direction and remove the cartridge by sliding it in a direction paral-

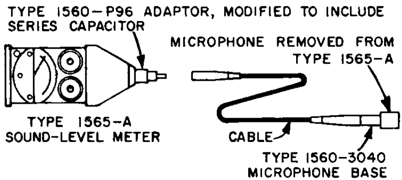

Figure 5. Installation of an extension cable between sound-level meter and the microphone.

lel to its axis. Replace the microphone cartridge with the modified Type 1560-P96 adaptor, oriented so that the terminal marked G on the sound-level meter mates with the terminal marked G on the adaptor.

Next, push the pin jack attached to the black lead in the Type 1560-3040 Microphone Base onto the pin marked L on the microphone and push the white-lead pin jack onto the other pin. Fasten the microphone base to the cartridge by means of the setscrews in the base.

The extension cable can now be installed between the sound-level meter and the microphone base. The loss for the Type 1560-P73, 25-foot Extension Cable is found from Figure 4 to be 7.8 dB. This value must be added to the reading of the sound-level meter to obtain the actual sound level. Or the correction can be determined with the Type 1552-B Sound-Level Calibrator, which produces a level of 120 dB at the microphone (refer to paragraph 2.4).

When replacing the microphone on the sound-level meter, be sure the microphone terminal marked L mates with the socket terminal marked G.

The Type 1560-P73, 25-foot Extension Cable is available with the Type 1560-P32 Tripod as the Type 1560-P34 Tripod and Extension Cable.

2.7 USE AS A VIBRATION METER.

2.7.1 INSTALLATION.

Figure 6 shows the Type 1565-A Sound-Level Meter fitted with the Type 1560-P96 Adaptor and the Type 1560-P52 Vibration Pickup.[2] The microphone is replaced with the adaptor, as in paragraph 2.6, but in this case the adaptor requires no modification. The vibration pickup includes a short cable fitted with a three-terminal microphone connector that mates with the adaptor.

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[2]Two other pickups are also available: the Type 1560-P53, with a greater frequency range than the Type 1560-P52, and the Type 1560-P54, with greater sensitivity.

Figure 6. The sound-level meter fitted with the Type 1560-P96 Adaptor and the Type 1560-P52 Vibration Pickup.

2.7.2 CALIBRATION.

One method of calibrating the sound-level meter uses the Type 1557-A Vibration Calibrator, as follows:

Remove one of the 50-gram disks from the calibrator and mount the pickup in its place. (The cable must be free and unrestricted.) Set the calibrator on a level surface and turn it ON. Adjust the LEVEL control so that the meter indicates 100. Set the left-hand knob on the Type 1565-A to C_F and the right-hand knob to 110. Adjust the meter indication to +2 dB by means of the screwdriver control on the panel, between the knobs. The meter will now indicate a level of 112 dB when the pickup is subjected to an acceleration of one g, rms (386 inches per second per second). Use Table 1 to convert indicated levels in dB to acceleration in g's, rms.

The sound-level meter can also be calibrated by electrical means when the sensitivity of the Type 1560-P52 Vibration Pickup is known. Install the Type 1560-P96 Adaptor; then apply a voltage numerically equal to the pickup sensitivity in volts per g between terminals No. 1 and No. 3 of the adaptor input. (Terminal No. 1 is grounded to the instrument case). Set the knobs on the sound-level meter to C_F and 110 dB. The oscillator frequency should be between 100 and 1000 c/s. Adjust the panel screwdriver control for a meter indication of +2 dB. Install the pickup and use Table 1 to convert indicated dB levels to acceleration in g's, rms. The technique for measuring vibration is given in the GR Handbook of Noise Measurement. The frequency response for the combination of the Type 1565-A Sound-Level Meter and the Type 1560-P52 Vibration Pickup is shown in Figure 7.

2.8 BACKGROUND NOISE.

Measurements should be made with as little background noise as possible. For all weightings the background level should be at least 10 dB below the total measured level. When this cannot be done, apply the corrections given in Figure 8.

TABLE 1

ACCELERATION IN g's CORRESPONDING TO VARIOUS INDICATED LEVELS

Level in dB	*Accel in g's*	*Level in dB*	*Accel in g's*
44	.000398	66	.00501
45	.000447	67	.00562
46	.000501	68	.00631
47	.000562	69	.00708
48	.000631	70	.00794
49	.000708	71	.00891
50	.000794	72	.0100
51	.000891	73	.0112
52	.00100	74	.0126
53	.00112	75	.0141
54	.00126	76	.0159
55	.00141	77	.0178
56	.00159	78	.0200
57	.00178	79	.0224
58	.00200	80	.0251
59	.00224	81	.0282
60	.00251	82	.0316
61	.00282	83	.0355
62	.00316	84	.0398
63	.00355	85	.0447
64	.00398	86	.0501
65	.00447	87	.0562

TABLE 1 (CONT)

Level in dB	Accel in g's	Level in dB	Accel in g's
88	.0631	114	1.26
89	.0708	115	1.41
90	.0794	116	1.59
91	.0891	117	1.78
92	0.100	118	2.00
93	.112	119	2.24
94	.126	120	2.51
95	.141	121	2.82
96	.159	122	3.16
97	.178	123	3.55
98	.200	124	3.98
99	.224	125	4.47
100	.251	126	5.01
101	.282	127	5.62
102	.316	128	6.31
103	.355	129	7.08
104	.398	130	7.94
105	.447	131	8.91
106	.501	132	10.0
107	.562	133	11.2
108	.631	134	12.6
109	.708	135	14.1
110	.794	136	15.9
111	.891	137	17.8
112	1.00	138	20.0
113	1.12	139	22.4
		140	25.1

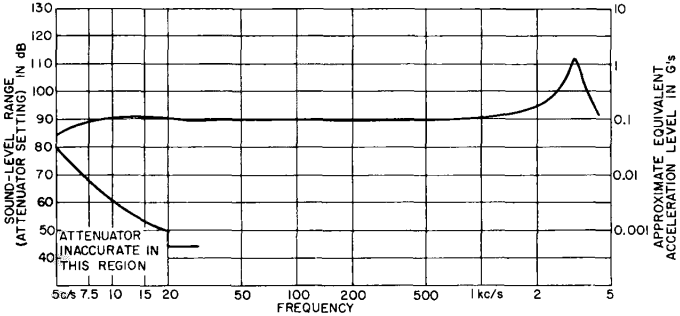

Figure 7. Frequency response of the Type 1560-P52 Vibration Pickup in combination with the Type 1565-A Sound-Level Meter.

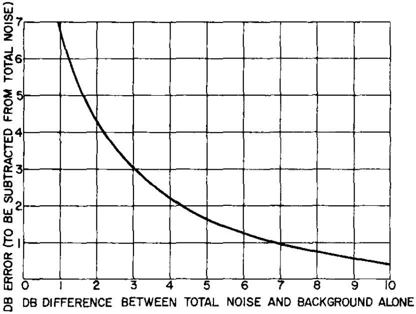

Figure 8. Effect of background noise on measurements.

SECTION 3

PRINCIPLES OF OPERATION

3.1 MICROPHONE.

General Radio's new lead-zirconate-titanate ceramic microphone was developed as a measurement-grade microphone. With a diameter of 0.936 inch, it fits into any fixture designed to accept the current industry-standard Western Electric 640-AA Condenser Microphone. A typical free-field frequency-response curve for the new microphone is shown in Figure 9.

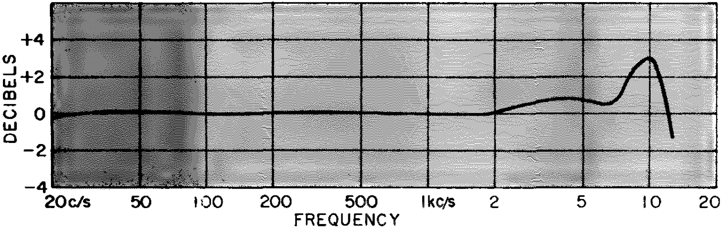

Figure 9. A typical free-field frequency-response curve for the new General Radio microphone.

3.2 CIRCUIT.

The all-solid-state circuit (Figure 11) contains a total of seven transistors in two amplifier stages and the power supply.

The preamplifier includes transistors Q101 and Q102. The former is a special N-channel field-effect transistor, operating as a "source follower." The gain of the second transistor, Q102, can be adjusted by means of a panel screwdriver control, to calibrate the instrument.

The main amplifier uses four transistors, including a complementary pair, Q105 and Q106, at the output. Feedback is applied to the emitter of Q103 to stabilize the voltage gain. This amplifier feeds both the meter-detector circuit and the output terminals.

The attenuator is separated into two sections for best signal-to-noise ratio. One section is located directly at the input; the other is between the amplifier stages. The panel control, calibrated from 50 to 130 dB, adjusts the attenuation in 10-dB steps.

Each coupling and feedback path in

the Type 1565-A Sound-Level Meter serves double duty, also forming part of the weighting network. To achieve the A-weighting characteristic, for example, the feedback network in the main amplifier provides a roll-off of 6 dB/octave at both 733 c/s and at 8 kc/s. The coupling network between the preamplifier and the main amplifier adds roll-off starting at 32 c/s, and the combination of the input resistance of the instrument and the microphone capacitance yields an additional slope of 6 dB/octave, starting at 107 c/s.

Since the equivalent microphone capacitance serves as part of the weighting network, the spectrum is partly weighted before it is introduced to the preamplifier, which reduces the likelihood of overloading the amplifier. The source capacitance cannot be changed, however, without affecting the weighting characteristic.

3.3 POWER SUPPLY.

The unique power supply includes a simple dc-to-dc converter, to permit operation from a single 1.5-volt C cell. The circuit is basically a tuned, selfbiased, class-C oscillator, operating at a frequency of 130 kc/s. The ac output voltage from the transformer is applied to a full-wave voltage doubler rectifier consisting of diode CR1, the transistor base-emitter junction, and capacitors C1 and C2. Half of the dc output voltage biases the transistor in the cut-off region, affording the desired class-C operation, with a conversion efficiency of about 70 percent. The high efficiency of power supply and amplifier makes possible a battery life of 35 hours; it is therefore unnecessary to turn the instrument on and off during a series of measurements, to conserve the battery.

SECTION 4

SERVICE AND MAINTENANCE

4.1 GENERAL.

General Radio warrants that each new instrument sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or part that is found within the two-year period not to meet these standards after examination by our factory, district office, or authorized repair agency personnel, will be repaired, or, at our option, replaced without charge, except for tubes, or batteries that have given normal service.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest sales engineering office, requesting a "Returned Material Tag." Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.2 DISASSEMBLING THE INSTRUMENT.

To remove the nose cone, simply unscrew the large knurled nut above the knobs on the panel.

Removal of two screws, below the battery springs, will permit removal of the back cover.

Turn the two screws on either side of the microphone in a clockwise direction to remove the microphone. Be sure to tighten them (CCW) when the microphone is replaced. Use a small Allen-type wrench.

4.3 TRANSISTOR VOLTAGES.

Table 2 gives the normal voltages from the indicated transistor terminals to ground, with a fresh battery installed in the instrument. A deviation of ten percent from these figures should be allowed. Set the left-hand knob on the panel to C_F and the right-hand knob to 130; use a vacuum-tube voltmeter for the measurements.

TABLE 2

TRANSISTOR VOLTAGES

Transistor	*Terminal*	*DC Volts to ground*
Q101 (TR-32/C6601) (Crystalonics)	Drain	10.8
	Source	4.6
	Gate	3.9
Q102 (TR-47/2N2714)	E	4.1
	B	4.6
	C	13.0
Q103 (TR-77/2N3390)	E	8.8
	B	9.3
	C	20.4
Q104 (TR-11/2N1377)	E	20.6
	B	20.5
	C	10.8
Q105 (TR-4/2N1304)	E	10.8
	B	10.8
	C	22.1
Q106 (TR-5/2N1305)	E	10.8
	B	10.8
	C	0
Q107 (TR-11/2N1377)	E	12.2
	B	22.1
	C	10.7

4.4 INTERNAL NOISE.

Table 3 gives the typical internal noise levels measured in octave bands for each setting of the right-hand knob (attenuator). To measure the internal noise levels, replace the microphone with a 380-pF capacitor (the equivalent

TABLE 3

Octave-band noise levels measured at the output jack, referred to the output level corresponding to full-scale meter deflection.

OCTAVE-BAND CENTER FREQUENCY (c/s)	ATTENUATOR SETTING IN DB: 130	120	110	100	90	80	70	60	50
31.5	76	65	75	65	75	65	54	44	34
63	73	62	72	62	72	62	52	42	32
125	72	61	71	61	71	61	51	41	31
250	71	61	71	61	71	61	50	40	30
500	71	61	70	60	71	61	50	40	30
1000	71	61	70	60	71	61	50	40	30
2000	71	61	69	59	71	61	50	40	30
4000	71	61	68	58	72	62	51	41	31
8000	72	62	68	58	73	63	53	43	33
All Pass	62	52	60	50	62	52	41	31	21
Typical Ripple Component 130 kc/s	47	42	47	42	47	42	37	35	31

impedance of the microphone). The capacitor and its connecting leads must be shielded.

In addition to the audio-frequency noise, a noise component will be found at about 130 kc/s, the ripple frequency of the power supply. Typical levels of this component are also given in the table. Note, however, that if a wide-band device, such as a voltmeter, oscilloscope, or recorder, is connected to the output jack, the power-supply ripple may appear as the dominant noise component. This component can be reduced somewhat if a small capacitor of the appropriate value is connected across the output of the sound-level meter and the load.

4.5 ELECTRICAL CALIBRATION.

The over-all gain of the amplifier can be checked and adjusted as follows:

Apply 1 volt at 400 c/s or 1 kc/s to the sound-level meter through a shielded 380-pF capacitor connected in place of the microphone. Set the left-hand knob (weighting) to C_F and the right-hand knob (attenuator) to 130 dB. The correct meter indication depends upon the sensitivity of the microphone, as given on its attached calibration certificate. These meter indications are given in Table 4.

TABLE 4

Meter indication for various microphone sensitivities with 1 volt applied through a 380-pF capacitor at the microphone socket.

MICROPHONE SENSITIVITY IN DB RE 1 VOLT/μBAR	*METER INDICATION WITH ATTENUATOR SET TO 130*
-57	+1
-58	+2
-59	+3
-60	+4
-61	+5
-62	+6
-63	+7

4.6 OVER-ALL CALIBRATION.

The procedure for obtaining a pressure calibration by means of the GR Type 1552-B Sound-Level Calibrator is described in paragraph 2.4. This calibration will be performed free of charge at any General Radio Office.

A wide-frequency-range pressure calibration can also be performed using the GR Type 1559-A or -B Microphone Reciprocity Calibrator. Refer to the Operating Instructions for these instruments.

ACCESSORY INSTRUMENTS

TYPE 1552-B
SOUND-LEVEL CALIBRATOR

A convenient accessory instrument for checking the calibration of sound-level meters, including the circuitry and the microphone (whether ceramic, crystal, dynamic, or condenser). Requires a signal of 2 volts at 400 c/s, which can be obtained from the Type 1307-A Transistor Oscillator.

TYPE 1557-A
VIBRATION CALIBRATOR

Provides simple, accurate calibration of vibration pickups and measuring systems. This battery-operated instrument offers single-frequency (100 c/s) calibration of accelerometers ranging in mass up to 300 grams, including the GR vibration pickups and the accelerometers from other manufacturers.

TYPE 1307-A
TRANSISTOR OSCILLATOR

Provides a 400- and 1000-cycle source of power for use with the Type 1552-B Sound-Level Calibrator. A convenient audio-frequency source for general testing requirements.

TYPE 1556-A
IMPACT-NOISE ANALYZER

An amplifier-voltmeter system designed to measure peak value and time duration of impact sounds or vibrations. Operates from the output of a sound-level meter or a noise analyzer.

PARTS LIST

CAPACITORS

C101	Ceramic,		
	.0022μF ±20% 500V		4404-2220
C102	"	.01μF +80-20% 50V	4401-3100
C103	"	.01μF +80-20% 50V	4401-3100
C104	"	0.68pF ±10% 500V	4400-0068
C105	"	82pF ±5% 500V	4404-0825
C106	Plastic,		
	.01μF ±10% 100V		4860-7750
C107	Electrolytic,		
	10μF +100-10% 25V		4450-3800
C108	"	40μF +100-10% 6V	4450-3600
C109	"	10μF +100-10% 25V	4450-3800
C110	Plastic,		
	.091μF ±5% 100V		4860-7889
C111	Electrolytic,		
	"	60μF +100-10% 25V	4450-2900
C112	"	5μF +100-10% 50V	4450-3900
C113	Mica,		
	51pF ±5% 500V		4640-0316
C114	Electrolytic,		
	47μF ±20% 20V		4450-5614
C115	"	60μF +100-10% 25V	4450-2900
C116	"	5μF +100-10% 50V	4450-3900
C117	"	1.5μF ±20% 20V	4450-4400
C118	"	5μF +100-10% 50V	4450-3900
C119	"	1.5μF ±20% 20V	4450-4400
C120	"	40μF +100-10% 6V	4450-3600
C121	"	0.68μF ±10% 50V	4450-4315
C122	"	10μF +100-10% 25V	4450-3800
C123	Ceramic,		
	270pF ±10% 500V		4404-1278
C124	Electrolytic,		
	1.5μF ±20% 20V		4450-4400
C125	Ceramic,		
	270pF ±10% 500V		4404-1278

RESISTORS

R101	Composition, 100kΩ ±5% 1/4W	6109-4105
R102	Film, 2.94MΩ ±1% 1/4W	6250-4294
R103	" 4.32MΩ ±1% 1/4W	6250-4432
R104	Composition, ±5% Selected in GR Laboratory	
R105	" 12MΩ ±5% 1/4W	6099-6125
R106	Film, 1.27MΩ ±1% 1/8W	6250-4127
R107	Composition, 82kΩ ±5% 1/4W	6099-3825
R108	" 13MΩ ±5% 1/4W	6099-6135
R109	" 47kΩ ±5% 1/4W	6099-3475
R110	" 91kΩ ±5% 1/4W	6099-3915
R111	" 30kΩ ±5% 1/4W	6099-3305
R112	" 15kΩ ±5% 1/4W	6099-3155
R113	" 510Ω ±5% 1/4W	6099-1515
R114	Potentiometer, Composition 2kΩ ±20%	6041-2209
R115	Film, 130kΩ ±1% 1/8W	6250-3130
R116	Composition, 3.9kΩ ±5% 1/4W	6099-2395
R117	" 91kΩ ±5% 1/4W	6099-3915
R118	" 10kΩ ±5% 1/4W	6099-3105
R119	" 270Ω ±5% 1/4W	6099-1275
R120	" 91Ω ±5% 1/4W	6099-0915
R121	" 75kΩ ±5% 1/4W	6099-3755
R122	" 51kΩ ±5% 1/4W	6099-3515
R123	" 510kΩ ±5% 1/4W	6099-4515
R124	Film, 20.5kΩ ±1% 1/8W	6250-2205
R125	" 10kΩ ±1% 1/8W	6250-2100
R126	" 732Ω ±1% 1/8W	6250-0732

R127	" 2.55kΩ ±1% 1/8W	6250-1255
R128	" 332Ω ±1% 1/8W	6250-0332
R129	Composition,	
	" 300kΩ ±5% 1/4W	6099-4305
R130	" 3.3kΩ ±5% 1/4W	6099-2335
R131	" 24kΩ ±5% 1/4W	6099-3245
R132	" 20kΩ ±5% 1/4W	6099-3205
R133	" 2.7kΩ ±5% 1/4W	6099-2275
R134	" 18kΩ ±5% 1/4W	6099-3185
R135	" 100kΩ ±5% 1/4W	6099-4105
R136	" 300kΩ ±5% 1/2W	6100-4305
R137	" 10kΩ ±5% 1/4W	6099-3105

MISCELLANEOUS

BT101	Battery 1.5V C Cell	8410-0100
CR101	Diode 1N34A	6082-1003
CR102	Diode 1N34A	6082-1003
CR103	Diode 1N34A	6082-1003
J101	Jack	4260-1295
M101	Meter	5730-1375
MK101	Microphone	1560-2130
Q101	Transistor C6601	8210-1032
Q102	Transistor 2N2714	8210-1047
Q103	Transistor SE-4002	8210-1077
Q104	Transistor 2N1377	8210-1377
Q105	Transistor 2N1304	8210-1304
Q106	Transistor 2N1305	8210-1305
Q107	Transistor 2N1377	8210-1377
S101	Switch	7890-3250
S102	Switch	7890-3240
SO101	Socket	1565-1010
T101	Transformer	1565-2020
Etched-Circuit Board Assembly		1565-2701

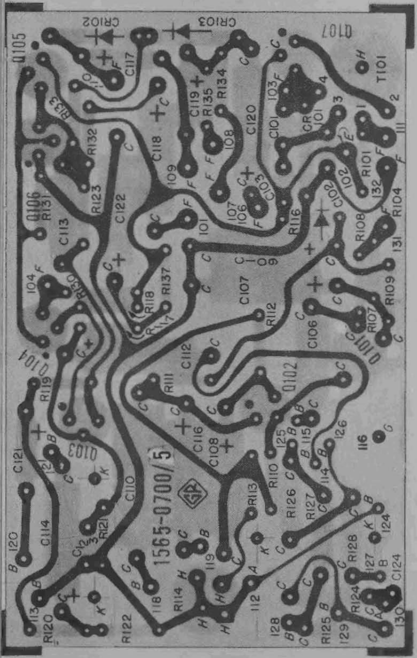

Figure 10. Etched-circuit board for the Type 1565-A Sound-Level Meter. (For complete etched-circuit board assembly, order 1565-2701.)

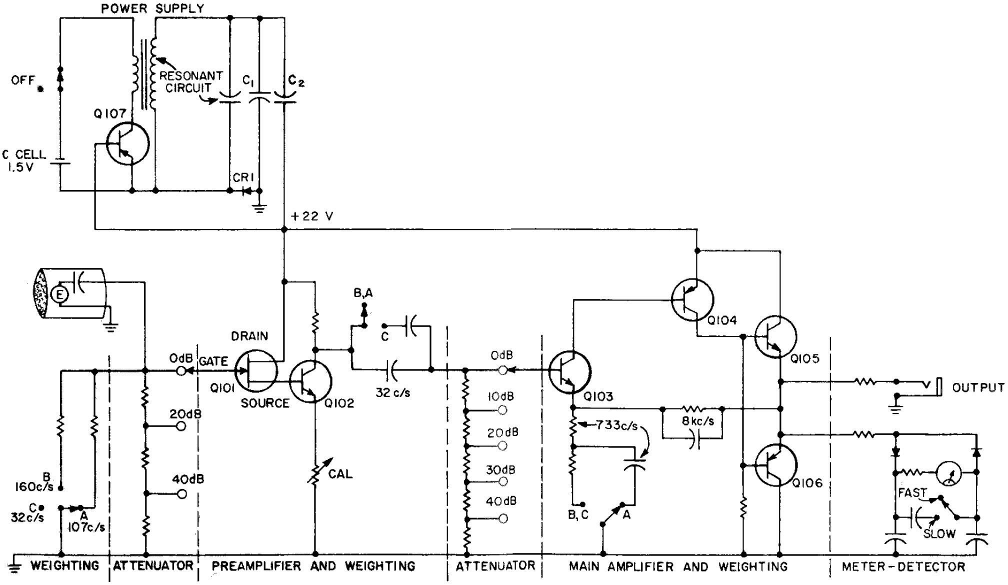

Figure 11. Elementary schematic diagram of the Type 1565-A Sound-Level Meter.

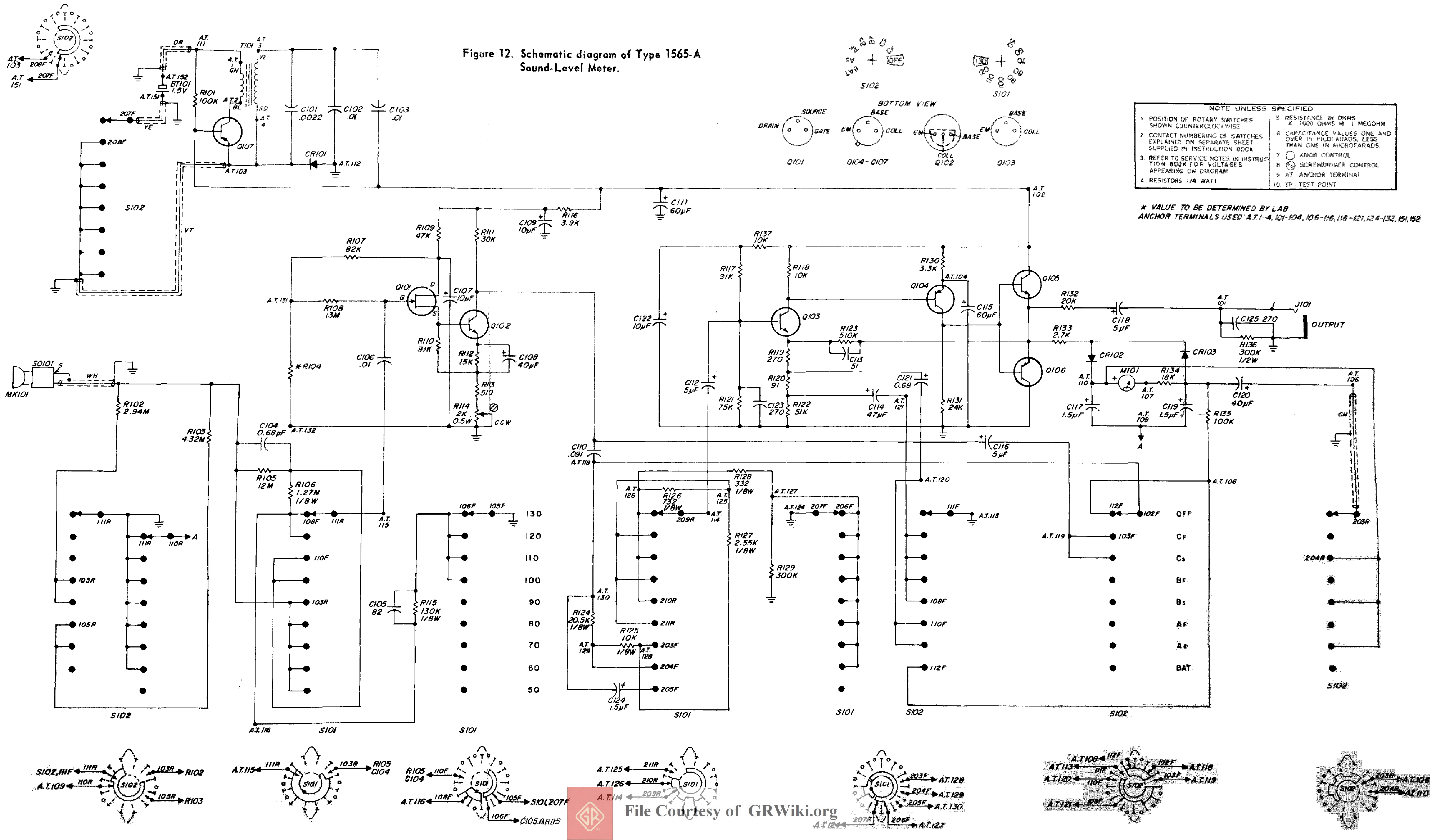

Figure 12. Schematic diagram of Type 1565-A Sound-Level Meter.

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Printed in USA